



Board of Studees in Geology
2019-20 (Even Semesters)



Government College (Autonomous)
Rajahmundry



Index

S No	Semester	Details	Page No
		Index	i-ii
		About the Department	iii-iv
1		Proceedings of the Principal	1
2		Composition of BoS (2019-20)	2
3		Allocation of Credits	3
4		BoS Resolutions	4-7
5		List of Examiners & Paper Setters	8
6	II	Syllabus of Course II: Mineralogy & Optical Mineralogy (Theory & Practical)	9-11
7		Internal Assessment for II Semester	11
8		Model Question Paper: Mineralogy & Optical Mineralogy (Theory)	12
9		Model Question Paper: Mineralogy & Optical Mineralogy (Lab)	13
10	IV	Syllabus of Course IV: Structural Geology & Stratigraphy (Theory & Practical)	14-15
11		Model Question Paper: Structural Geology & Stratigraphy (Theory)	16
12		Model Question Paper: Structural Geology & Stratigraphy (Practical)	17
Elective Courses			
13	VI	Syllabus of Course VII: Groundwater: Geology & Exploration (Theory & Practical)	18-19
14		Model Question Paper: Groundwater: Geology & Exploration (Theory)	20
15		Model Question Paper: Groundwater: Geology & Exploration (Practical)	21
16	VI	Syllabus of Course VII: Field Geology (Theory & Practical)	22
Cluster Courses			
17	Cluster A1	Syllabus of Cluster Course VIIIA -1: Introduction to Mineral Exploration (Theory & Practical)	23-24
18		Model Question Paper: Introduction to Mineral Exploration (Theory)	25
19		Model Question Paper: Introduction to Mineral Exploration (Practical)	26
20	Cluster A2	Syllabus of Cluster Course VIIIA -2: Environmental Geology (Theory)	27-28
21		Project work	28
22		Model Question Paper: Environmental Geology	29

23	Cluster A3	Syllabus of Cluster Course VIIIA -3: Introduction to Remote Sensing & GIS	30-31
24		Field Report	31
25		Model Question Paper: Introduction to Remote Sensing & GIS (Theory)	32
26	Cluster B1	Syllabus of Cluster Course VIIIB -1: Introduction to Geochemistry (Theory & Practical)	33
27		Model Question Paper: Introduction to Geochemistry	34
28	Cluster B2	Syllabus of Cluster Course VIIIB -2: Introduction to Geophysics (Theory & Practical)	35
29		Model Question Paper: Introduction to Geophysics (Theory)	36
30	Cluster B3	Syllabus of Cluster Course VIIIB -3: Introduction to Remote Sensing & GIS	37-38
31		Model Question Paper: Introduction to Remote Sensing & GIS (Theory)	39
32	Cluster C1	Syllabus of Cluster Course VIIIC -1: Introduction to Mining Geology (Theory)	40
33		Model Question Paper: Introduction to Mining Geology	41
34	Cluster C2	Syllabus of Cluster Course VIIIC -2: Introduction to Marine Geology (Theory)	42
35		Model Question Paper: Introduction to Marine Geology (Theory)	43
36	Cluster C3	Syllabus of Cluster Course VIIIC -3: Introduction to Petroleum Geology (Theory)	44
37		Model Question Paper: Introduction to Petroleum Geology	45

About the Department

Introduction

The department of geology of the Government College (Autonomous), Rajahmundry, established in 1959, is one of the oldest and reputed departments in the state of Andhra Pradesh. Many eminent geologists working in various geological organizations in the country are the pride products of this department. The William King's Gallery (Museum) has more than 2000 Rock & Mineral specimens and rare fossils. Currently, the department is catering to the educational needs of about 500 students with 4 different programs with different combinations.

Programs offered by the department (2019-20)

S No	Program offered (Combination)	Sanctioned strength (2019-20)	Admitted strength (I Yr)	Admitted strength (II Yr)	Admitted strength (III Yr)
1	B.Sc. (Maths, Physics, Geology)	60(70)	68	69	68
2	B.Sc. (Maths, Geology, Chemistry)	30(35)	37	33	38
3	B.Sc. (Maths, Geology, Computer Sc.)	30(35)	38	34	--
4	B.Sc. (Geology, Geography, Computer Sc.)	30(35)	35	31	25
5	M.Sc. (Geology)	30	16	--	--
6	Ph.D. (Geology)				
	TOTAL		194	167	131

Faculty working

S No	Name of the Faculty	Qualification	Designation
1.	Lt. D. Rudra	M.Sc. (Ph.D)	Assistant Professor
2	Dr. M.R. Goutham	M.Sc., Ph.D., SLET	Assistant Professor
3	Mr. B. Saikrishna	M.Sc.	Assistant Professor
4	Ms.S. Durga Bhavani	M.Sc.	Assistant Professor
5	Ms. K. Maneesha	M.Sc. NET	Assistant Professor
6	Mr. S. Venkatesh	M.Sc.	Assistant Professor
7	Mr. Bharat	M.Sc. NET	Assistant Professor
8	Dr. R. Anil Kumar	M.Sc., Ph.D.	Assistant Professor

Infrastructural Facilities

- **2 Laboratories:**
 - 1) M.S. Krishnan Hall
 - 2) C. Mahadevan Hall
 - 3) William King's Gallery (Museum)
- **Learning Resources**
 - Departmental Library with ___ books

- Petrological microscopes.
- Thin sections of Rocks & Minerals
- Wooden samples of Dam, crystal.
- Different varieties of fossils.

Research

- The Department of Geology has been recognized as **Research Centre** by the Adikavi Nannaya University in the year 2016
- The Lecturer-in-Charge of the department Lt. (Smt.) D. Rudra had published 2 National and 1 International Papers. She has submitted her Ph.D. thesis from Andhra University, Visakhapatnam and awaiting results.
- Dr. M.R. Goutham has been actively engaged in research and published his work in National & International Journals.
- To inculcate Research Aptitude in students, the department assigns project work for meritorious students

Best Practices

- Word of the day (Saluting the geological word with each other.
- GEO NEWS (a monthly NEWS magazine)
- **Geology club**
- The Geology club in the department of Geology was inaugurated on 20
 - November 2013 with an aim to bring out the inherent knowledge
 - and leadership qualities present in the students.
- Active and meritorious students in the department are identified and the responsibilities of conducting Geology Club activities are given to them.
- Some of the key activities of the club are conducting the following
 - Running a monthly newsletter “GeoNews” by club members, i.e., students.
- Maintenance of wall magazine in the department namely 'GeoNews'
- Geoquiz
- Group discussions on recent global geological aspects
- JAM sessions on causes of recent natural calamities
- Debate on day today burning topics
- Create environmental awareness among the students
- Maintaining cleanliness in the department

M. R. Goutham



Proceedings of the Principal, Government Autonomous College, Rajamahendravaram

Present: Dr.R.David Kumar Swamy, M.Sc, M.Phil., Ph.D

Rc. No: Spl./Acad.Cell-GC[A]-RJY/BOS/2019-20, Dated: 15 November 2019

Sub:- Government Autonomous College, Rajamahendravaram- Boards of Studies (BoS) for even semesters - Nomination of Members - Orders Issued.

Ref:- UGC Guidelines for Autonomous Colleges - 2018.

ORDER:

The Principal, Government College [A], Rajamahendravaram is pleased to constitute **Board of studies in GEOLOGY** for framing the syllabi in Geology subject for even semesters of the Academic year 2019-20 duly following the norms of the UGC Autonomous guidelines.

S. No	Name	Designation
1	Dr. M.R. Goutham Lecturer in Geology, GC[A], Rajamahendravaram	Chairman
2	All Faculty members in the department	Member
3	Dr. S.S.K. Chaitanya, Head, Department of Geology, Sir CRR College, Eluru	Subject Expert
4	Dr. C. Krishna, Principal, PR Govet. (A) College, Kakinada	Subject Expert
5	Dr. K.V. Swamy, Asst. Professor in Geology, Adikavi Nannaya Univrsity, Rajamahendravaram	University Nominee
6	P.R. Bhavana, DGM, ONGC, Rajamahendravaram	Expert from Industry/Corporate Sector
7	I. Indira Rani	Student Nominee

The above members are requested attend the BOS meetings and share their valuable views, suggestions on the following functionaries:

- Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and national requirement for consideration and approval of the Academic Council
- Suggest methodologies for innovate teaching and evaluation techniques
- Suggest panel of names to the Academic council for appointment of examiners
- Coordinate research, teaching, extension and other activities in the department of the college.

The term of the members will be two years from the date of the nomination. The Chairman of the BoS (HoD/lecturer In-Charge of the department) is directed to coordinate with the Principal of the College and conduct BoS meetings as and when necessary, but at least once a year.

**PRINCIPAL . . .
GOVERNMENT COLLEGE [A]
JAHMUNDRY**

Copy to:

- The above individuals
- File



**Composition of Board of Studies in Geology
Government College [Autonomous]
Rajamahendravaram**

Composition of BoS in Geology (2019-20)

S. No	Name	Designation
1	Dr. M.R. Goutham Lecturer in Geology, GC[A], Rajamahendravaram	Chairman
2	Sri B. Saikrishna	Faculty Member
3	Ms. S. Durga Bhavan	Faculty Member
4	Ms. K. Maneesha	Faculty Member
5	Sri. S. Venkatesh	Faculty Member
6	Dr. S.S.K. Chaitanya, HoD, Department of Geology, CRR College, Eluru	Subject Expert
3	Dr. C. Krishna, Principal PR Govt. (A) College, Kakinada	Subject Expert
4	Dr. K.V. Swamy, Asst. Professor in Geology Adikavi Nannaya University, Rajamahendravaram	University Nominee
5	Sri P.R. Bhavana, DGM (Retd.), ONGC, Rajamahendravaram	Expert from Industry/Corporate Sector
6	I. Indira Rani	Student Nominee



Department of Geology
Government College [A], Rajamahendravaram

Allocation of Credits

Program: B.Sc.

Subject: Geology

S. No	Semester	Title of the Paper	Hrs./week	Max. Marks	Mid Sem. Exam	Credits
1	Semester-II	Course- II- Mineralogy& Optical Mineralogy	4	50	50	3
2	Lab-II	Mineralogy & Optical mineralogy	3	50	--	2
3	Semester-IV	Course -IV- Structural Geology & Stratigraphy	4	60	40	3
4	Lab-IV	Structural Geology	3	50	--	2
5	Semester VI	Course VII- Groundwater : Geology & Exploration (<i>Elective1</i>) (OR) Field Geology (<i>Elective2</i>) (OR) Sedimentology	3	60	40	3
6	Lab VII	Groundwater Geology & Exploration (OR) Field Geology (OR) Sedimentology	3	50	--	2
Course VIII- <i>Cluster Electives*</i>						
7	Semester VI (Cluster 1)	Course VIIIA -1: Introduction to Mineral Exploration	3	60	40	3
		Course VIIIA-2: Environmental & Engineering Geology	3	60	40	3
		Course VIIIA-3: Introduction to Remote Sensing & GIS	3	60	40	3
8	Cluster 1 Lab	Course VIIIA -1: Mineral Exploration	3	50	--	2
		Course VIIIA-2: Project work	3	50	--	2
		Course VIIIA-3: Fieldwork	3	50	--	2
9	Semester VI (Cluster 2)	Course VIIIB-1: Introduction to Geochemistry	3	60	40	3
		Course VIIIB-2: Introduction to Geophysics	3	60	40	3
		Course VIIIB-3: Introduction to Remote Sensing & GIS	3	60	40	3
10	Cluster 2 Lab	Course VIIIB-1: Geochemistry	3	50	--	2
		Course VIIIB-2: Field Report	3	50	--	2
		Course VIIIB-3: Project work	3	50	--	2
11	Semester VI (Cluster 3)	Course VIIIC-1:Introduction to Mining Geology	3	60	40	3
		Course VIIIC2:Introduction to Marine Geology	3	60	40	3
		Course VIIIC3: Introduction to Petroleum Geology	3	60	40	3
12	Cluster 3 lab	Course VIIIC-1: Mining Geology	3	50	--	2
		Course VIIIC-2: Field Report	3	50	--	2
		Course VIIIC-3: Project work	3	50	--	2

Chairman, BOS
(M.R. GOUTHAM)



The Board of Studies of **GEOLOGY** met on 21 November 2019 at 11-00 A.M in the department of Geology on under the chairmanship of Dr. M.R. Goutham and the following resolutions were adopted.

Resolutions

1. It is resolved to approve the syllabi for even semesters for 2019-20 by the BoS consisting of university nominee, subject experts, industrial expert and alumni.
2. It is also resolved to approve model question papers and blue print approved by the Board of studies.
3. It is resolved to approve the CIA:SEE as approved by the Staff Council of the College as 50:50 for the 2019-20 admitted batch for all the semesters and 40:60 for the 2018-19 admitted batch.
4. It is resolved to approve the following split up of the marks for CIA:SEE for 2019-20 admitted batch for all the semesters.

For 2019-20 admitted batch

S.No.	Component		Distribution of Marks
1	CIE I (after completion of 50% of syllabus)		20
2	CIE II (Online Exam)		10
3	ATTENDANCE	Above 95%	5
		91% to 95%	4
		86% to 90%	3
		81% to 85%	2
		75% to 80%	1
		Below 75%	0
Pedagogical Strategies			
4	ASSIGNMENT		5
5	Participation or Paper Presentation in Student Seminars/Workshops/Group Discussions/ Quiz/ Student Study Project/Field Visit/Survey		5
6	Viva-voce		5
CIA TOTAL			50
SEE			50
Grand Total			100



5. It is resolved to approve the following split up of the marks for question papers for all the semesters.

For 2018-19 admitted batch

Semester End Exam (60 Marks)		Internal assessment (40 Marks)
PART	Allotted Marks	
PART A: This Part contains 4 Essay type internal choice questions numbering 1 to 4 will be asked Unit 1 to 5. Student has to answer all the 4 questions. Each question carries 8 marks.	4 x 8 = 32 Marks Question 1 A or B from Unit I Question 2 A or B from Unit II Question 3 A or B from Unit III Question 4 A from Unit IV and or B from Unit V	Written Test : 25 Marks Assignments: 5 Marks Seminar: 5 Marks Viva-Voce: 5 Marks
PART B: This Part contains 8 Short answer questions numbering 5 to 12 will be asked covering all the units. Student has to answer any 5 out of 8 questions. Each question carries 4 marks.	5 x 4 = 20 Marks Questions 5, 6,7,8,9 are from Units I, II, III, IV and V respectively. Questions 10,11, 12 are from all 5 units depending on the weightage of the unit	
PART C: This Part carries 8 marks. 4 very short answer questions numbering 13 to 16 will be asked covering all the units. Student has to answer all the questions Each question carries 2 marks	4 x 2 = 8 Marks	
Total Marks	60	40

6. It is resolved to approve the following split up of the marks for question papers for all the semesters for 2019-20 admitted batch

Semester End Exam (50 Marks)		Internal assessment (50 Marks)
PART	Allotted Marks	
PART A: This Part contains 4 Essay type internal choice questions numbering 1 to 4 will be asked Unit 1 to 5. Student has to answer all the 4 questions. Each question carries 8 marks.	4 x 8 = 32 Marks Question 1 A or B from Unit I Question 2 A or B from Unit II Question 3 A or B from Unit III Question 4 A from Unit IV and or B from Unit V	As given in resolution No: 4 above
PART B: This Part contains 8 Short answer questions numbering 5 to 12 will be asked covering all the units. Student has to answer any 5 out of 8 questions. Each question carries 4 marks.	6 x 3 = 18 Marks Questions 5 to 12 are from Units I, II, III, IV and V respectively. Questions 10,11, 12 are from all 5 units depending on the weightage of the unit	
Total Marks	50	50



7. It is resolved to have Lab/Field Report/Project work for the cluster electives to instil research aptitude among the students.
8. It is resolved to approve the list of examiners & paper setters for all the 3 years
9. **It is resolved to make Geological Field Trips compulsory for III B.Sc. Students as the subject is field based science. Student has to submit a field report which will have evaluation by external expert. Similarly I and II year students are also encouraged to carryout field trip.**
10. It is resolved to strictly follow the Annual Curricular Plan submitted to the College.
11. It is resolve to conduct a State level student centric activity **“Bhuvana Bodha-2020”** which was initiated in the AY 2018-19 by the **“Geology Club”** in the month of February 2020.
12. It is resolved to have lab for Cluster course 1 (A1/B1/C1) and Project for Cluster Course 2 (A2/B2/C2) and Field Report for Cluster Course 3 (A3/B3/C3).
13. It is resolved to conduct one inter-disciplinary State level seminar/workshop in collaboration with Physics/chemistry/statistics/Botny/Zoology/Computer Science departments during March 2020.
14. It is resolved to continue the in house news letter **“GeoNews”** which was started during last academic year (2014-15) by the Geology Club and involve all the students in club activities.
15. It is resolved to arrange for at least 2 expert lectures/ invited talks by the subject/industry experts in the current academic year to expose the students to the advancements in the subject concerned.
16. It is resolved to put forth before BOS the proposal of starting a Certificate/Diploma course in **“Groundwater Exploration”/Remote Sensing & GIS** depending on the collaboration with A.P. State Groundwater Board/any Remote Sensing Agency.
17. It is resolve to make instruction more student centric than conventional by involving them in various activities.
18. It is resolved to initiate a **new B.Sc. program with Geology, Statistics and Computer Science or Mathematics, Statistics and Geology combination** from the 2020-21 academic year as it provides more job opportunities for the students.



The following members were present.

S. No	Name	Designation	Signature
1	Dr. M.R. Goutham	Faculty Member	
2	Sri B. Saikrishna	Faculty Member	
3	Ms. S. Durga Bhavani	Faculty Member	
4	Ms. K. Maneesha	Faculty Member	
5	Sri S. Venkatesh	Faculty Member	
6	Dr. S.S.K. Chaitanya, HoD, Department of Geology, CRR College, Eluru	Subject Expert	
7	Dr. C. Krishna, Principal PR Govt. (A) College, Kakinada	Subject Expert	
8	Dr. K.V. Swamy, Asst. Professor in Geology Adikavi Nannaya University, Rajamahendravaram	University Nominee	
9	P.R. Bhavana, DGM, ONGC, Rajamahendravaram	Expert from Industry/Corporate Sector	
10	G. Indira Rani	Student Nominee	

Chairman, BOS
(M.R. GOUTHAM)



List of Examiners & Paper Setters

S No	Name of the Examiner/Paper Setter	College	Experience	Paper Taught
1	Dr. S.S.K. Chaitanya	Sir CRR College, Eluru (WG Dist)	15	Economic Geology, Structural Geology, Petrology
2	Sri K. Santhosh	HoD, Geology, DNR College Bhimavaram (WG Dist)	4	All branches of Geology
3	Sri G. Trinadh Babu	Sir CRR College (A), Eluru (WG Dist)	4	Physical Geol., Mineralogy, Palaentology, Groundwater Geology
4	Dr. K.V. Swamy	Assoc. Professor Dept. of Geology ANUR, Rajahmundry	11	Mineral Exploration, Geophysics
5	Sri U. Padmanabha Raju	Maharaja College (A), Vizianagaram	30	All branches of Geology

University Nominee:

(K.V. SWAMY)

Industrial Nominee:

(P.R. BHAVANA)

Subject Expert:

(S.S.K. CHAITANYA)

Subject Expert:

(C. KRISHNA)

Staff Members:

Chairman, BOS:

(M.R. GOUTHAM)



Government College (Autonomous), Rajamahendravaram.

(Affiliated to Adikavi Nannaya University)

SEMESTER- II - Syllabus

Course-II- Mineralogy & Optical Mineralogy (50 Marks)

Course outcomes

CO1-To Study minerals and mineral sections and infer them by their physical and optical properties.

CO2-To understand how Mineralogy and Optical Mineralogy are used to identify the mineralogical composition of geological materials in order to help reveal their origin and evolution

CO3- To study the minerals samples (hand samples & thin sections) in the laboratory with a petrographic microscope

CO4-To apply the knowledge in the field to identify the rocks

Unit - I

Definition of a mineral - classification of minerals into rock forming and ore forming minerals.

Physical properties of minerals - Colour, streak, transparency, lustre, form, hardness, tenacity, cleavage, fracture and, Specific gravity.

Silicate structures- isomorphism, solid solution, polymorphism, allotropy. Pseudomorphism and radioactivity

Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Olivine, Garnet and Aluminium silicates,

Unit-II

Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Pyroxenes, Amphibole and Mica

Unit-III

Study of physical properties, chemical properties and mode of occurrence of the following mineral groups: Quartz, Feldspars, and feldspathoids

Miscellaneous: Staurolite, Tourmaline, Zircon, Calcite, Corundum and Apatite.



Unit-IV

General Principles of optics, Refraction, Snell's law, Critical angle, total reflection,

Optical properties of minerals – isotropic and anisotropic

Polarised light, refractive index, Double refraction, uniaxial and biaxial minerals – Nicol prism and its construction – concept of crossed Nicols

Unit-V

Petrological microscope (Polarising) - its mechanical and optical parts – extinction, pleochroism and interference colours. Optical Properties of important minerals

Text books:

1. A textbook of mineralogy - E.S. Dana and W.E. Ford.
2. Rutleys elements of mineralogy - H.H. Reed
3. Essential of Crystallography - E. Flint.

References:

1. Manual of mineralogy - C.S. Hurlbut and C.Klein
2. Mineralogy for students - M.H. Batey.
3. An introduction to rock forming minerals - Deer, Howie, and zussman.
4. Elements of mineralogy - Mason and Bern.

LAB-II (Practicals)

50 Marks

At the end of Second semester

Practical-II- Mineralogy and Optical mineralogy

Study of physical properties and diagnostic features of the following mineral:

Quartz Jasper, Agate, Chalcedony, Amethyst, Orthoclase, Microcline, Albite, Anorthite, Labradorite, Enstatite, Hypersthene, Augite, Hornblende, Actinolite, Tremolite, Asbestos, Muscovite, Biotite, Phlogopite, Olivine, Epidote, garnet, Kyanite, Sillimanite, Andalusite, Beryl, Zircon, Apatite, Corundum, Talc, Gypsum, Calcite, Fluorspar and Serpentine.



Study of optical properties of the following minerals:

Quartz, Orthoclase, Microcline, Plagioclase, Hypersthene, Augite, Tremolite, Hornblende, Muscovite, Biotite, Olivine, Epidote, Garnet, Kyanite, Beryl, Calcite, Chlorite, sillimanite, Leucite.

Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

I B.Sc., GEOLOGY– (2019-20)

Internal assessment (w.e.f.2019-20)

As per the Examination Policy of the College, 50 marks are allocated for Continuous Internal Assessment, which is shown below.

CIA 1 (Direct Assessment)	--	20 m
CIA 2 (Online Test)	--	10 m
Assignment	--	05m
Pedagogical Strategies	--	05m
Attendance	--	05 m
Viva –Voice	--	05 m
		<hr/>
		50 m
		<hr/>

Model Question paper for CIA 1

Answer the following questions

Question No 1 (Essay question) }
Question No 2 (Essay question) } $2 \times 5m = 10 M$

Answer all the following questions $5 \times 2m = 10 M$

Question No 3
Question No 4
Question No 5
Question No 6
Question No 7

Model Question paper for CIA 2

20 multiple choice questions will be given for $\frac{1}{2}$ mark each. Student has to answer all the questions. $20 \times \frac{1}{2} = 10 M$



GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM.

(Affiliated to Adikavi Nannaya University)

I B.Sc., GEOLOGY –(2019-20)

SECOND SEMESTER

Model Question Paper

(Mineralogy and Optical Mineralogy)

Time: 2 ½ Hours

Max.Marks: 50

PART- A

Answer all the Questions. *Each Question carries 8 marks*

4 x 8 = 32M

1. Explain different types of Silicate Structures with suitable sketches and mineral examples

OR

Explain different physical properties of minerals

2. Describe the Pyroxene group of Minerals.

OR

Describe physical & chemical properties and mode of occurrence of Amphiboles

3. Describe physical & chemical properties and mode of occurrence of Feldspars

OR

Describe the Quartz group of Minerals.

4. What are different optical properties of minerals? Explain.

OR

Explain different optical properties studied under Microscope

PART- B

Answer any **Six** Questions. *Each Question carries 3 marks*

6 x 3 = 18M

5. Rock forming and ore forming minerals
6. Isomorphism and polymorphism.
7. Name the feldspathoid minerals with chemical compositions
8. Snell's law
9. Parts of microscope
10. Define Pyro electricity and Piezo electricity.
11. Moh's Hardness Scale
12. Define Uniaxial and Biaxial minerals



Government College (Autonomous), Rajamahendravaram.

(Affiliated to Adikavi Nannaya University)

I B.Sc., GEOLOGY PRACTICALS – 2019-20

PRACTICAL MODEL QUESTION PAPER FOR Course II

At the End of II Semester

Time: 3 hours

Max.Marks: 50

- 1) Description of Physical Properties, Diagnostic features of Minerals (4Nos)
4X5=20
- 2) Identification of thin sections of mineral and describe the optical Properties
4X5=20
- 3) Record Preparation 10 Marks

50 Marks



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

GEOLOGY SYLLABUS - (2019-20)

II B.Sc., IV-SEMESTER

Course IV: Structural Geology & Stratigraphy (60 Marks)

Course outcomes

- CO1-To understand the concepts of Structural geology, three dimensional distribution of large bodies of rocks
- CO2- To interpret stress and kinematic histories from structural measurements.
- CO3- To know about the relative position of strata and their relationship to the geological timescale
- CO4- To gain knowledge on the analysis of the order and position of layers of archaeological remains

Unit-I

Definition of structural geology, aim and objectives of the structural Geology; Importance of study of structures, primary and secondary structures; outcrop, attitude of beds - strike, dip and apparent dip. Use of clinometer and Brunton compass. **Folds** -description, nomenclature of folds - Geometrical and genetic classification. Recognition of folds in the field.

Unit-II

Joints- Classification of Joints- geometrical and genetic classification. **Faults** – geometrical and Genetic Classification of faults, recognition of faults in the field, effects of faults on the outcrops.

Unit-III

Unconformities- Definition of unconformity- types of unconformities. Recognition of unconformities in the field. Distinguishing the faults from unconformities. Definitions of overlap, outlier, cleavage, schistosity, foliation and lineation

Unit-IV

Stratigraphy: Definition and Principles of Stratigraphy. Nomenclature of Stratigraphy (Lithostratigraphy, Biostratigraphy, Chronostratigraphy, magnetostratigraphy etc.)

Unit- V

Standard geological time scale, Physiographic divisions of India with stratigraphic and structural characteristics.



Text books

- | | | |
|---|---|------------------------|
| 1. Structural Geology | - | Marlarid. P. Billings. |
| 2 An outline of structural Geology | - | E.S. Hills |
| 1.Principals of stratigraphiy | - | Dunbars & Rodgers. |
| 2. Fundamentals of Historical Geology and Stratigraphiy | - | Ravindra Kumar |

References

- | | | |
|-------------------------------------|---|----------------------------------|
| 1. Structural Geology | - | L.U. De Setter |
| 2. An outline of structural Geology | - | E.S. Hills |
| 3. Geology of India (Vol. 1 & 2) | - | R. Vydyanadhan & M. Ramakrishnan |

Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

LAB-IV (Practicals)

50 Marks

At the end of Fourth semester

Structural Geology

1. Study of topographical maps.
2. Interpretation of simple geological maps with horizontal and inclined beds, Unconformity, folds and faults with reference to the topography and structure, geological succession and history, Section drawing (at least 10 maps)
3. Problems dealing with true dip and apparent dip. Bore-hole data thickness and width of the outcrop and dip of the beds (At least 10 problems).
4. Finding attitude of beds using stereographic projection.
5. Arranging geological events in chronological sequence in given geological section.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

II B.Sc., GEOLOGY 2019-20

IV SEMESTER

Model Question Paper

Course II: Structural Geology & Palaeontology

Time:3 Hours

Max.Marks:60

SECTION- A

Answer all the Questions. *Each Question carries 10 marks*

4 x 8 = 32M

- 1) What are faults? How do you classify them? Describe with neat sketches.
OR
Classify and describe different types of folds and describe the criteria for their recognition in the field
- 2) Describe different types of unconformities and discuss the criteria for their recognition
OR
Write an essay on joints.
- 3) Define Stratigraphy. What are different Principles of Stratigraphy
OR
Write an essay on Standard Geological Time Scale
- 4) Describe different Physiographic Features of India with their structural Characteristics.
OR
Write an essay on geological timescale of India

SECTION- B

Answer any Five Questions. *Each Question carries 4 marks*

5 x 4 = 20M

- 5) Define Hinge and axis of folds
- 6) Inlier and Outlier
- 7) Columar Joints
- 8) Fault scrap
- 9) Graben & Horst
- 10) Recognition of faults in the field
- 11) Order of superposition
- 12) Lithostratigraphy

SECTION- C

Answer all the Questions. *Each Question carries 2 marks*

4 x 2 = 8 M

- 13) Anticline and Syncline
- 14) What are symmetrical and asymmetrical ripples?
- 15) Mention few rock types found in Peninsular India
- 16) What is the difference between Azoic and palaeozoic eras?



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

II B.Sc., GEOLOGY 2019-20

IV SEMESTER

Practical Model Question Paper

Paper II: Structural Geology

1. Interpretation of Geological Maps	_____	1 X 10=10
2. Problems	_____	1 X 10=10
3. Stereographic Projection	_____	1 X 5= 5
4. Chronological sequence	_____	1 X 10=10
5. Viva-Voce	_____	5
6. Record	_____	10 m
TOTAL		50 Marks



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Elective Paper

Course-VII-: Ground Water: Geology & Exploration

CO1- To have fundamental knowledge on the occurrences of the ground water, and its application in the irrigation and domestic purposes

CO2- To be able to use suitable data to calculate the exploitable storage, specific yield and specific retention of an aquifer.

CO3- To have thorough knowledge of the the types of rock that usually make good aquifers, and assess how good an aquifer a rock could be, given its porosity and hydraulic conductivity.

CO4- To be able to distinguish between unconfined and confined aquifers, and recognize conditions in confined aquifers that will produce a flowing artesian well.

Unit-I

Introduction: Definition of Hydrology, Hydrogeology, Scope and application of Hydrogeology. Hydrological Evaporation, Condensation, Precipitation, Infiltration, Transpiration. Evapotranspiration. runoff, connate water.

Ground Water: Origin, Occurrence, and age of groundwater, Vertical distribution of sub-surface water, zone of aeration-soil water, vadose water, capillary fringe. Zone of saturation - water table. Perched water table. Recharge and discharge areas.

UNIT-II

Aquifers: Definition of aquifer, Aquitard, Aquiclude, Aquifuge. Properties of Aquifer - porosity, retention of water in rocks, yield of water from rocks (specific yield and specific retention), Darcy's law, permeability, hydraulic conductivity, velocity of groundwater flow, storage co-efficient. Types of aquifers: confined, semi-confined, unconfined. Homogeneous, Heterogeneous. Isotropic and Anisotropic aquifers. Igneous, sedimentary and metamorphic rocks as aquifers.

UNIT-III

Quality of Ground Water: Physical, chemical and Biological characteristics of groundwater. Suitability of groundwater for drinking, Irrigation and industrial purposes. Pollution of Ground Water; Pollution in relation to urban, industrial and Agricultural sources. Brief account of saline water intrusion.

UNIT – IV

Ground Water Investigations: Scope of investigations, Methods of groundwater explorations, Brief account of Geologic, hydrogeologic, Geobotanical investigations, Introduction to Remote Sensing techniques. Geophysical Exploration: Basic principles of Geophysical exploration methods; Electrical methods -



Schlumberger and Wenner configuration, Resistivity profiling and Vertical Electrical Sounding.

Unit-V

Management Of Groundwater: Groundwater balance, recharge, (natural and artificial) and discharge. Safe, yields and over draft. Cojunctive use of surface and groundwater. Utilization of groundwater. Groundwater resource evaluation-water table fluctuation method and rainfall infiltration method. Ground water provinces of India. Concept of water shed management.

Text Books:

- | | | |
|--|---|-------------------|
| 1. Groundwater hydrology | - | Todd |
| 2. Hydrogeology | - | Davis and Dewiest |
| 3. Hydrogeology | - | Karanth |
| 4. Groundwater Assessment - Development and Management | - | Karanth |
| 5. Apphed Hydrogeology | - | Fetter. |
| 6. Applied principles of Hydrogeology | - | Mannings. |

Lab VII- Ground Water: Geology & Exploration (50 Marks)

- Study of hydro-geological models,
- Estimation of porosity and permeability from the given data;
- Preparation and interpretation of water table maps.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

**SEMESTER-VI- Elective Paper
Ground Water: Geology & Exploration
Model Question Paper**

Time: 3 Hours

Max.Marks: 60

Note: Answer any Four Questions All questions carry equal marks.

4 X 10=40

PART- A

- 1). Define Hydrology and Hydrogeology. Explain the scope and applications of Hydrogeology.
- 2). Define Hydrologic Cycle and describe the different process involved with the help of a neat diagram,
- 3). Give an account of vertical distribution of Ground water.
- 5). What is an aquifer? Describe various types of aquifer.
- 6). Explain the rock properties of an aquifer of ground water.

PART – B

4 x 5 = 20

Answer any Four Questions. Each question carry 5 marks

7. What are the Forms Of Ground Water
8. Define Porosity And Permeability?
9. What are standards For Domestic water by WHO?
10. What is the Role of Geologist in Hydrogeology?
11. Difference between the consolidated and unconsolidated deposits?
12. Describe Recharge pit method



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Elective Paper

PRACTICAL MODEL PAPER

Course -VII-: Ground Water: Geology & Exploration

Max.Marks: 50

1. Experiment	-----	1 X 10 = 10
2. Problems	_____	2 X 10 = 20
3. Field work	_____	10
4. Record	—	10
	<hr/>	
	Total Marks	50



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Elective Paper

Course-VII: Field Geology

Unit-I

Toposheet and map. Toposheet and map reading. Various methods of locating a point on toposheet and map.

Unit-II

Basic field procedure – Basic field equipments, methods of field work, drawing of geological field sections.

Determination of slopes and gradient, measuring differences in elevation. Basic field observations at a point or out crop.

Unit-III

Geological mapping – General considerations, reconnaissance study of surface features and rocks.

Unit-IV

Transfer of field data collected on to a base map, finalization of map, preparation of geological cross section.

Unit-V

Contouring- Definition, internal characteristic, direct and indirect methods of contouring and uses.

References:

1 Principles of Engineering Geology - K.V.G.K Gokhale.

Lab VII: Field Geology (50 Marks)

Field work: Submission of Dissertation / Field Report.

Note: Field training camp: Ten days during vacation/ Working Days (Compulsory)

Study of toposheets and field work in the neighbouring areas and also other places of geological importance.



CLUSTER PAPERS

Cluster A VIIIA -1: Introduction to Mineral Exploration (Theory)

CO1- To use the knowledge to develop an exploration strategy for an ore deposit based on a genetic model

CO2-. To understand the importance of Geologists and characteristics and requirements of a Geologist.

CO3- To understand the role played by a geologist in mining rocks and his pivotal role in the economy of the nation

CO4- To know about the purpose of mineral exploration - the discovery and acquisition of new mineral deposit amenable to economic extractive operations now or in future

UNIT - I

Definitions of Prospecting and Exploration. Reconnaissance, Preliminary and Detailed survey. Geological prospecting: Guides and Criteria. Structural, Lithological and Stratigraphic Guides.

UNIT- II

Geophysical Exploration - brief description and application of gravity methods - instruments in gravity method: gravimeters. Brief description and application of magnetic methods – instruments in magnetic method: magnetometers. Brief description and application of seismic methods - instruments in seismic method: geophones.

UNIT- III

Brief description and application of electrical methods - instruments in electrical method: Resistivity meter. Brief description and application of radioactive methods - instruments in radioactive method: G-M Counter, Scintillometer, Ionisation chamber.

UNIT – IV

Geochemical prospecting – primary and secondary dispersion – Geochemical association and path finders. Sampling Methods – Channel, Chip, Grab, Car, groove, Wagon, Pitting and trenching and drill hole sampling. Coning and quartering. Average Assay

UNIT-V

Mining: Alluvial, Quarrying (Open cast mining) and Underground mining. Drilling Methods – Rotary drilling and Percussion drilling. Remote sensing techniques in mineral exploration.

Text Books:



1. Geological Prospecting & Exploration - V. M. Kneiter
2. Mineral Economics - R.K.Sinha & N.L.Sarma.
3. Mining Geology – McKinnstry

Mineral Exploration – Syllabus (Practical)

1. Estimation of Ore reserves: Bedded type and vein type (Extended area and included area methods)
2. Field work in neighboring areas of geological importance: submission of dissertation/ field report (10 Marks). Study and interpretation of topographic maps





Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII A1

Introduction to Mineral Exploration

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 10 = 40

1. What is Geological mapping? Describe the Geological methods in mineral exploration.
2. Describe the Geochemical dispersion and geochemical methods in exploration. Add a note on path finders.
3. What are proved, probable and possible reserves? Describe the reserve estimation methods.
4. What is resistivity? Describe electrical resistivity methods in mineral exploration.
5. What is sampling? Describe different types of sampling methods.
6. What is mining? Describe different mining methods.
7. What is Geological mapping? Describe the Geological methods in mineral exploration.
8. Write notes on the following
 - a.) Gravity method
 - b.) Magnetic method.

Part – B

Answer any Four of the following questions.

4 x 5 = 20

9. Average Assay
10. Geological prospecting
11. Geological mapping
12. Seismic method
13. Radio activity method.
14. Drilling methods
15. Alluvial Mining
16. Ore Dressing



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII A1

Introduction to Mineral Exploration

PRACTICAL

(AT THE END OF VI SEMESTER)

SEMESTER-VI- Cluster Course VIII A1

Introduction to Mineral Exploration

- 1) Estimation of Ore reserves: Bedded type and vein type (Extended area and included area methods)
- 2) Sampling Techniques – Preparation of composite sample of sediment by coning and quartering methods



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII A1

Introduction to Mineral Exploration

VIIIA-2: Environmental Geology

CO1- To have knowledge on the relation between Geology and environment and how to use the knowledge of Geology to prevent the natural disasters and protect the environment

CO2-. To make interpretation of land forms and earth processes to identify potential geologic and related manmade hazards that may impact civil structures and human development.

CO3- To understand the importance of the branch of Engineering Geology in Environmental protection

CO4- To apply the knowledge of Geology in understanding the reasons for environmental problems

Unit-I

Introduction, Concepts of environmental geology – History of environmental geology environmental awareness, Role of Geologist in environmental Protection and Planning, Management. Environmental problems- natural and manmade problems. Earth system science: atmosphere, hydrosphere and lithosphere.

Unit-II:

Definition of soil, soil formation, soil profile, Types of soils, Classification of soils and its properties, Soil distribution in India. soil degradation and contamination. Pollution: definition, types (air, water, land, soil). Global warming, ozone depletion

Unit-III

Natural disasters: earthquake and tsunamis- Earthquake terminology, seismic zones of India, history of earthquakes & tsunamis of India and major earthquakes & tsunamis in the world. Volcanoes: volcanic hazards its effects on human beings and environment. Indian volcanoes Landslides: Types ,causes and mitigation methods.

Unit-IV

Coastal hazards: definition of coasts. waves and currents, types of coastal hazards, sediment supply and erosion. coastal zone protection and management. Introduction to coastal zones, Indian coast lines. Floods and cyclones: types, causes & mitigation.

Unit-V

Mining impact on environment and health hazards, Environmental considerations in location and construction of dams, reservoirs and tunnels. Types of wastes and its



disposal with special reference to hazardous chemical wastes and radioactive waste. Oil leakages in ocean and its impact on marine life.

Project work (50 Marks)

The student has to submit a project work pertaining to environmental issues in place of practical record. The submitted project will be evaluated by the external examiner and the marks will be assigned as per his/her recommendations.

Text Books:.

1. Environmental Geology - K S Valdiya
2. Environmental Geology - Sudarshan V, Ravi C and Krishna Ch
3. Living with Earth: An introduction to Environmental Geology - Travis Hudson
4. Environmental Geology - Strainer & Strahier
5. Environmental Geology - Landgreen 6. Environmental Geology – Keller



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII A2

Environmental Geology

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8 = 32

1)A). Describe Environmental concept.

OR

B). Write about Fundamentals of Earth system.

2)A). Describe the types of soils and classification of soils.

OR

B). Describe the applications of remote sensing in Environmental Geology.

3)A). Write about the mining impact on the Environment.

OR

B). What are the measures taken for the site selection for dams?

4)A). Write about the Geological hazards in Environmental Geology.

OR

B). Describe Beach Erosion and sedimentation.

Part – B

Answer any Four of the following questions.

5 x 4 = 20

5. Role of Geologist in Environment.

6. Environmental awareness.

7. Waste Disposal

8. Surface Water Reservoirs

9. Mineral resource depletion

10. Geological hazards

11. Coastal zone protection

PART – C

4 x 2m = 8

Answer all the Questions. Each question carry 2marks.

12. Mass wasting

13. Global warming

14. definition of waves and currents

15. Soil profile



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII A-3: Introduction to Remote sensing & GIS

CO1- To have knowledge on Remote Sensing and GIS - studying mapping of geological characteristics of regions without physical contact with the areas being explored

CO2- To analyse the principles and components of photogrammetry and remote sensing.

CO3- To compute an image visually and digitally with digital image processing techniques.

CO4- To study about the application of knowledge of remote sensing and GIS in different civil engineering activities.

UNIT – I : Remote Sensing

Definition - Components of Remote Sensing - Energy, Sensor, Interacting Body - Active and Passive Remote Sensing - Platforms - Aerial and Space Platforms - Balloons - Helicopters, Aircraft and Satellites- Synoptivity and Repetivity - Electro Magnetic Radiation (EMR) - EMR spectrum - Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave - Black Body Radiation-Planck's law - Stefan Boltzman law.

UNIT - II : EMR Interaction with Atmosphere and Earth Materials

Atmospheric characteristics - Scattering of EMR - Raleigh, Mie, Non-selective and Raman Scattering - EMR Interaction with Water vapour and ozone - Atmospheric Windows -Significance of Atmospheric windows - EMR interaction with Earth Surface Materials Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy - Reflectance - Specular and Diffuse Reflection Surfaces - Spectral Signature - Spectral Signature curves. EMR interaction with water, soil and Earth Surface.

UNIT - III : Optical and Micro-wave Remote Sensing

Satellites - Classification- Based on Orbits- Sun Synchronous and Geo Synchronous- Based On Purpose, Earth Resources Satellites, Communication Satellites, Weather Satellites, Spy Satellites - Satellite Sensors-Resolution - Spectral, Spatial Radiometric and Temporal Resolution, Description of Multi Spectral Scanning, Along and Across Track Scanners - Description of Sensors in Landsat, SPOT, IRS series - Current Satellites-Radar - Speckle- Back Scattering - Side Looking Airborne Radar - Synthetic Aperture Radar - Radiometer - Geometrical characteristics.

UNIT – IV: Geographical Information System (GIS)



GIS- Components of GIS - Hardware, Software and Organizational Context Data -Spatial and Non-Spatial, Maps - Types of Maps, Projection - Types of Projection-Data Input - Digitizer, Scanner - Editing - Raster and Vector data structures - Comparison Of Raster and Vector data structure, Analysis using Raster and Vector data - Retrieval Reclassification, Overlaying, Buffering- Data Output- Printers and Plotters.

UNIT – V

Visual Interpretation of Satellite Images - Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image, Image enhancement, Filtering, Classification - Integration of GIS and Remote Sensing - Application of Remote Sensing And GIS, Urban Applications- Integration of GIS and Remote Sensing - Application of Remote Sensing and GIS - Water resources - Urban Analysis - Watershed Management - Resources Information Systems.

Books Recommended:

1. S. Kumar., 2016. Basics of Remote Sensing & GIS, University Science Press, New Delhi
2. Bhatta, B., 2008. Remote Sensing and GIS. Oxford, New Delhi.
3. Gupta, R.P., 1990. Remote Sensing Geology. Springer Verlag.
4. Lilleasand, T.M. and Kiffer, R.W., 1987. Remote Sensing and Image Interpretation. John Wiley.
5. Pandey, S.N., 1987. Principles and Application of Photogeology. Wiley Eastern, New Delhi.
6. Sabbins, F.F., 1985. Remote Sensing – Principles and Applications. Freeman.
7. Siegal, B.S. and Gillespie, A.R., 1980. Remote Sensing in Geology. John Wiley.

Field Report (50 Marks)

The student has to carryout fieldwork in and around AP and submit a Field Report in place of practical record. The submitted Field Report will be evaluated by the external examiner and the marks will be assigned as per his/her recommendations.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Paper VIII B3

Introduction to Remote Sensing & GIS

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8m = 32

1. What is remote sensing? Write about fundamental elements of remote sensing?
OR
2. What is EMR and what do you understand by EMR? With neat sketch?
3. Advantages and Disadvantages of Remote sensing data?
OR
4. How does Electromagnetic radiation interact with water?
5. Define scattering and what are the types of scattering?
OR
6. Write an essay on applications of Remote sensing in mineral exploration?
7. What are basic interactions that take place on the earth surface?
OR
8. Explain the interaction of EMR with vegetation ,soil and water.?

Part – B

Answer any Five of the following questions.

5 x 4m = 20

9. What is a RADAR and write down the RADAR equation?
10. What are applications of remote sensing and GIS in water resources management?
11. What are maps ? what are different types of maps?
12. What is a satellite and what are the different types of satellites used in remote sensing?
13. What are characteristics of EMR interaction with soil particles?
14. What are atmospheric windows and what significance of atmospheric windows?
15. What are spectral signature curves and what do you understand by spectral signature?

PART – C

4 x 2m = 8

Answer all the Questions. Each question carry 2marks.

16. Black body
17. Expand GIS,SPOT
18. What is the meaning of Geosynchronous satellite
19. Types of maps



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course

Cluster - B VIIIB-1: Introduction to Geochemistry

Unit 1:

Concepts of geochemistry Introduction to properties of elements: crystal chemistry
Chemical bonding, Geochemical classification of elements

Unit 2 :

Geochemistry of solid Earth: The Earth in relation to the solar system, Cosmic abundance of elements. Composition of different planets. Layered structure of Earth and their chemistry

Unit 3:

Classification of Meteorites and their chemistry, Geochemical dispersion. Distribution of major, minor and trace elements in igneous, metamorphic and sedimentary rocks.

Unit 4:

Geochemical cycle. Introduction to isotope geochemistry., Stable isotopes and unstable isotopes and its applications, Half life. Isomorphism and polymorphism

Unit 5:

Geochemistry and principles of evolution of atmosphere, hydrosphere and biosphere

SUGGESTED READINGS:

1. Mason, B. (1986) Principles of Geochemistry. 3rd Edition, Wiley New York.
2. Rollinson, H. (2007) Using geochemical data – evaluation, presentation and interpretation 2nd Edition. Publisher Longman Scientific & Technical.
3. Walther, J. V. (2009). Essentials of geochemistry. Jones & Bartlett Publishers.
4. Albarède, F. (2003). Geochemistry: an introduction. Cambridge University Press.
5. W.M. White Geochemistry, Wiley & Blackwell

Elements of Geochemistry - (Practical)

1. Identification of rocks based on the geochemical data given.
2. Geochemical classification of water.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII B1

Introduction to Geochemistry

Time: 3Hrs

Max. Marks: 60

Section – A

4X 8m = 40

Answer five questions out of 8 Questions. Each question carried 8 marks.

1. A. Discuss about the concept of geochemistry and geochemical evolution of earth ?
OR
B. Write an essay on Geochemical classification of elements ?
2. A. Discuss about the role of trace element in geochemistry ?
OR
B. Give a detail note on principles of ionic substitution in minerals ?
3. A. Write an essay on geochemical cycle ?
OR
B. Write an essay on geochemical mobility in low and high P-T conditions ?
4. A. Write in detail about migration of elements in endogenic environment ?
OR
B. Give a detail note on applications of isotopes in geology ?

Section-B

5 X 4m=20

Answer any five of the following . Each question carry 4 marks

5. Write about the classification of meteorites.
6. Composition of meteorites.
7. Primary differentiation.
8. Isomorphism d. Dispersion.
9. Radioactive decay .
10. Mineral stability .
11. Ionic substitution.

Section – C

4 x 2m = 8

Answer all the Questions. Each question carry 2marks.

13. Rare earth elements
14. Trace elements
15. Lithophile element
16. Isotopes and Isobars



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course

VIIIB-2: Introduction to Geophysics

Unit.I

Geophysics Theory: Gravity and Magnetic fields of the earth: Normal-gravity field; Shape of the earth; Bouguer and isostatic anomalies, isostatic models for local regional compensation. Geomagnetic field, secular and transient variations and their Suggested Books: theories; palaeomagnetism, construction of polar wandering curves.

Unit II

Plate Tectonics and Geodynamics: Sea floor spreading and mid-oceanic ridges: Plate boundaries and seismicity.

Seismology & Tomography: Elements of earthquake seismology; Seismometry; Seismic moment tensor, focal mechanism and fault plane solutions; seismic gaps; Seismotectonics and structure of the earth; Himalayan and stable continental region earthquakes, Reservoir induced seismicity; Seismic hazards;

Unit III

Gravity and Magnetic Methods: Gravimeters and magnetometers; Data acquisition and corrections; Regional and residual separation; Interpretation of anomalies of simple geometric bodies, e.g. single pole, sphere, horizontal cylinder, sheet, dyke and fault.

Unit IV

Electrical and Electromagnetic Methods: Electrical profiling and sounding, resistivity transform and direct interpretation; Electromagnetic field techniques and interpretation; Magnetotelluric method, geomagnetic depth sounding.

Seismic Methods: Reflection, refraction, diffraction methods and data processing, seismic noises and noise profile analysis; seismic data recording and telemetry devices; Introduction to 3D seismic.

Unit V

Well logging and other methods: Electrical logs; sonic log; nuclear logging; cross plotting; determination of porosity; permeability, formation factor and density; principles of radioactive and geothermal

Practical:

- Determination of density by Nettleton method.
- Preparation of a residual map by (a) Graphical method and (b) Grid method.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII B2

Introduction to Geophysics

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8m = 32

1.A) Describe the specific methods of geophysical exploration used in groundwater survey.

OR

B) How do you apply your knowledge on the explanation of electrical method.

2.A) Can you list out different types of plate boundaries and explain them.

OR

B) Explain interior of the earth with neat diagram.

3.A)Based on what you know, how could you explain gravity method.

OR

B) What are various geomagnetic elements ? Explain with neat labeled diagram.

4.A) What knowledge do you have to describe about seismic method.

OR

B)Define well logging? And what are the different types of logging methods.

Section-B

5 X 4m=20

Answer any five of the following . Each question carry 4 marks

5. Paleomagnetism.
6. Seafloor spreading.
7. Reservoir induced seismicity.
8. Formation of Himalayas.
9. Gravimeters and magnetometer.
10. 3D seismic.
11. Self potential method

PART – C

4 x 2m = 8

Answer all the Questions. Each question carry 2marks.

12. Elemental composition of earth.
13. Convergent plate boundaries.
14. mid-oceanic ridges
15. Seismic hazards



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course

VIIIB-3: Introduction to Remote sensing & GIS

UNIT – I : Remote Sensing

Definition - Components of Remote Sensing - Energy, Sensor, Interacting Body - Active and Passive Remote Sensing - Platforms - Aerial and Space Platforms - Balloons - Helicopters, Aircraft and Satellites- Synoptivity and Repetivity - Electro Magnetic Radiation (EMR) - EMR spectrum - Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave - Black Body Radiation-Planck's law - Stefan Boltzman law.

UNIT - II : EMR Interaction with Atmosphere and Earth Materials

Atmospheric characteristics - Scattering of EMR - Raleigh, Mie, Non-selective and Raman Scattering - EMR Interaction with Water vapour and ozone - Atmospheric Windows -Significance of Atmospheric windows - EMR interaction with Earth Surface Materials Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy - Reflectance - Specular and Diffuse Reflection Surfaces - Spectral Signature - Spectral Signature curves. EMR interaction with water, soil and Earth Surface.

UNIT - III : Optical and Micro-wave Remote Sensing

Satellites - Classification- Based on Orbits- Sun Synchronous and Geo Synchronous- Based On Purpose, Earth Resources Satellites, Communication Satellites, Weather Satellites, Spy Satellites - Satellite Sensors-Resolution - Spectral, Spatial Radiometric and Temporal Resolution, Description of Multi Spectral Scanning, Along and Across Track Scanners - Description of Sensors in Landsat, SPOT, IRS series - Current Satellites-Radar - Speckle- Back Scattering - Side Looking Airborne Radar - Synthetic Aperture Radar - Radiometer - Geometrical characteristics.

UNIT – IV: Geographical Information System (GIS)

GIS- Components of GIS - Hardware, Software and Organizational Context Data -Spatial and Non-Spatial, Maps - Types of Maps, Projection - Types of Projection- Data Input - Digitizer, Scanner - Editing - Raster and Vector data structures - Comparison Of Raster and Vector data structure, Analysis using Raster and Vector data - Retrieval Reclassification, Overlaying, Buffering- Data Output- Printers and Plotters.



UNIT – V

Visual Interpretation of Satellite Images - Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image, Image enhancement, Filtering, Classification - Integration of GIS and Remote Sensing - Application of Remote Sensing And GIS, Urban Applications- Integration of GIS and Remote Sensing - Application of Remote Sensing and GIS - Water resources - Urban Analysis - Watershed Management - Resources Information Systems.

Books Recommended:

1. S. Kumar., 2016. Basics of Remote Sensing & GIS, University Science Press, New Delhi
2. Bhatta, B., 2008. Remote Sensing and GIS. Oxford, New Delhi.
3. Gupta, R.P., 1990. Remote Sensing Geology. Springer Verlag.
4. Lilleasand, T.M. and Kiffer, R.W., 1987. Remote Sensing and Image Interpretation. John Wiley.
5. Pandey, S.N., 1987. Principles and Application of Photogeology. Wiley Eastern, New Delhi.
6. Sabbins, F.F., 1985. Remote Sensing – Principles and Applications. Freeman.
7. Siegal, B.S. and Gillespie, A.R., 1980. Remote Sensing in Geology. John Wiley.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

**SEMESTER-VI- Cluster Course VIII B3
Introduction to Remote Sensing & GIS**

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8m = 32

16. What is remote sensing? Write about fundamental elements of remote sensing?

OR

17. What is EMR and what do you understand by EMR? With neat sketch?

18. Advantages and Disadvantages of Remote sensing data?

OR

19. How does Electromagnetic radiation interact with water?

20. Define scattering and what are the types of scattering?

OR

21. Write an essay on applications of Remote sensing in mineral exploration?

22. What are basic interactions that take place on the earth surface?

OR

23. Explain the interaction of EMR with vegetation ,soil and water.?

Part – B

Answer any Five of the following questions.

5 x 4m = 20

24. What is a RADAR and write down the RADAR equation?

25. What are applications of remote sensing and GIS in water resources management?

26. What are maps ? what are different types of maps?

27. What is a satellite and what are the different types of satellites used in remote sensing?

28. What are characteristics of EMR interaction with soil particles?

29. What are atmospheric windows and what significance of atmospheric windows?

30. What are spectral signature curves and what do you understand by spectral signature?

PART – C

4 x 2m = 8

Answer all the Questions. Each question carry 2marks.

16. Black body

17. Expand GIS,SPOT

18. What is the meaning of Geosynchronous satellite

19. Types of maps



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIIC-1: Introduction to Mining Geology

UNIT-I

Mining Geology: Introduction: Definition, basic concepts, terminology, broad classification of mining methods, planning, Mines & Minerals Regulation & Development Act,

UNIT-II

Exploration and exploratory mining of surface and underground mineral deposits; Geological factors considered for the selection of mining method viz.- Alluvial/Surface mining, Quarrying, Open-cast mining, and Underground mining methods;

UNIT-III

Geological conditions for- Types of openings, their position, shape and size -adits, inclines, shafts, levels, cross-cuts, winzes and raises. Types of drilling methods. Hydraulic drilling, dredging.

UNIT-IV

Opencast/open pit/pit mining – Methods – bench cut, glory hole, strip mining. Factors considered for mechanization and transportation. Advantages and disadvantages

UNIT-V

Underground mining methods: Board and pillar, room and pillar, long wall mining. Mine supports-factors considered for types of supports used. Mine ventilation-planning, its significance and effects; Drainage planning, its significance and its effect. Mining hazards: mine inundation, fire and rock burst

SUGGESTED READINGS:

1. Mining geology. Mckcnistry.
2. Mining Geology: R. N. P. Arogya Swamy
3. Principles of Mine Planning By Jayanth Bhattacharya. Allied Publ.

Practical: Field report on nearest mines.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII C1

Introduction to Mining Geology

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8 = 32

1.A) Define Mining geology and write about broad classification of mining methods.

OR

B) What are the Geological factors considered for the selection of mining method .

2.A) Define underground mining? Describe the different types of underground mining methods.

OR

B) Write a brief note on Mines & Minerals Regulation & Development Act.

3.A) Define drilling? And write about the Types of drilling methods.

OR

B) What is open cast mining ? write about the advantages and disadvantages of open cast mining.

4.A) What is mine ventilation planning? And what is its significance.

OR

B) Write a brief note on mining hazards.

Part – B

Answer any Five of the following questions.

5 x 4m = 20

5. write about exploratory mining of underground deposits.

6. Bench cut mining method.

7. write short notes on quarrying.

8. describe long wall mining method.

9. write the difference between exploration and exploitation.

10. what are the factors consider for mechanization.

11. Drainage planning

PART – C

4 x 2m = 8

Answer all the Questions. Each question carry 2marks.

12. Trenching

13. Auditing.

14. Pitting.

15. Rotary drilling.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course

VIIIC-2: Introduction of Marine Geology

Unit-1:

Morphologic and tectonic domains of the ocean floor. Structure, composition and mechanism of the formation of oceanic crust. Hydrothermal vents- Ocean margins and their significance.

Unit-2:

Ocean Circulation, Coriolis effect and Ekman spiral, convergence, divergence and upwelling, El Nino. Indian Ocean Dipole, Thermohaline circulation and oceanic conveyor belt. Formation of Bottom waters; major water masses of the world's oceans.

Unit-3:

Oceanic sediments: Factors controlling the deposition and distribution of oceanic sediments; geochronology of oceanic sediments, diagenetic changes in oxic and anoxic environments. Tectonic evolution of the ocean basins.

Unit-4:

Mineral resources. Paleoceanography – Approaches to paleoceanographic reconstructions; various proxy indicators for paleoceanographic interpretation. Reconstruction of monsoon variability by using marine proxy records Opening and closing of ocean gateways and their effect on circulation and climate during the Cenozoic.

Unit-5:

Sea level processes and Sea level changes. Methods of paleo Sea Surface temperature. Quantifications.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII C2

Introduction to Marine Geology

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8 = 32

1.A) Write about the morphological features of ocean floor.

OR

B) Write about the structure, composition and mechanism of the formation of oceanic crust.

2.A) Describe the Indian Ocean Dipole.

OR

B) Write a brief note on thermohaline circulation.

3.A) What are the different types of oceanic sediments and controlling factors for their deposition.

OR

B) Explain the tectonic evolution of the ocean basins.

4.A) Define paleo oceanography ? and what are the approaches for the paleo oceanographic reconstructions.

OR

B) Add a note on Climatic conditions during Cenozoic era.

Part – B

Answer any Five of the following questions.

5 x 4m = 20

5. Write short notes on hydrothermal vents.

6. Define Ekman spiral and Ekman transport.

7. Oceanic conveyer belt.

8. Difference between El Nino and La Nino.

9. Write the different types of bottom water masses.

10. Define Gyre and name the currents present in subtropical gyre.

11. Western boundary intensification.

PART – C

Answer all the Questions. Each question carry 2marks.

4 x 2m = 8

12. Coriolis effect

13. Define upwelling

14. Abyssal plains

15. pelagic sediments.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course

VIIIC-3: Introduction to Petroleum Geology

Unit I:

Definitions and Introduction to Petroleum system; History of Petroleum exploration and development; Physical and chemical properties of Petroleum; Occurrence of petroleum - pools, fields and provinces; Occurrence of Oil and gas in India and world; Source rocks and their Properties.

Unit II:

Generation and migration of petroleum: Origin of petroleum, modern organic processes on earth surface - formation and maturation of kerogen, Diagenesis, Catagenesis, metagenesis - biogenic and thermal effect – Petroleum Migration and accumulation; Evaluation and analysis of kerogen and bitumen.

Unit-III:

Reservoir rocks - Properties, relationship between porosity, permeability and texture, effects of diagenesis on reservoir quality, reservoir continuity and characterization; Tilted OWC.

Unit IV:

Traps and seals: Nomenclature of trap - distribution of petroleum in a trap, seals and cap rocks - classification of traps; cap rocks thickness vs. effectiveness; transgressive shales as cap rocks;

Unit-V:

Geochemical programme for petroleum exploration; Biomarkers - source rock and oil correlation, oil and oil correlation using biomarkers; Petroleum reserves and estimation.

Books recommended:

1. Elements of petroleum geology- RC. Selley, Stephen A. Sonnenberg - Academic Press (2014)
2. Petroleum Geology- North, F.K, Allen Unwin.- 1985
3. Petroleum geochemistry and geology (2nd Ed.) - Hunt, J.M. (1996) - Freeman, San Francisco.

Reference books:

1. Tissot, B.P. and Welte, D.H. (1984): Petroleum formation and occurrence, Springer-Verlag.
2. Ravi Bastia, Geologic settings and petroleum Systems of India' east coast offshore basins concepts and application.



Government College (Autonomous), Rajamahendravaram

(Affiliated to Adikavi Nannaya University)

SEMESTER-VI- Cluster Course VIII B3

Introduction to Petroleum Geology

Model Question Paper

Time: 3 hrs

Max.Marks: 60

Part - A

Answer any Four of the following questions.

4 x 8 = 32

1. A .Discuss the history and development of petroleum exploration and development ?

Or

B. What are the types of source rocks ? Give a brief note on their properties ?

2 .A. Give in detail about the maturation of kerogen ?

or

B. Write a note on migration and accumulation of oil and gas ?

3. A. Write in detail about the Traps and seal rocks ?

or

B. Describe the geochemical program for petroleum exploration ?

7. A. Write about the classification of traps.

Or

B. write about petroleum reserves and its estimation.

SECTION- B

Answer any Five Questions. *Each Question carries 4 marks*

5 x 4 = 20M

5. Petroleum pool

6. Petroleum province

7. Diagenesis

8. Kerogen

9. Cap rock

10. Biomarker

11. Gas hydrate

12. Coal bed methane

PART – C

4 x 2m = 8

Answer all the Questions. Each question carry 2marks.

13. Define Petroleum Geology

14. Reservoir rock

15. Structural Traps

16. Coal bed methane

